Fermilab

Fermi National Accelerator Laboratory

Technical Division-Machine Shop

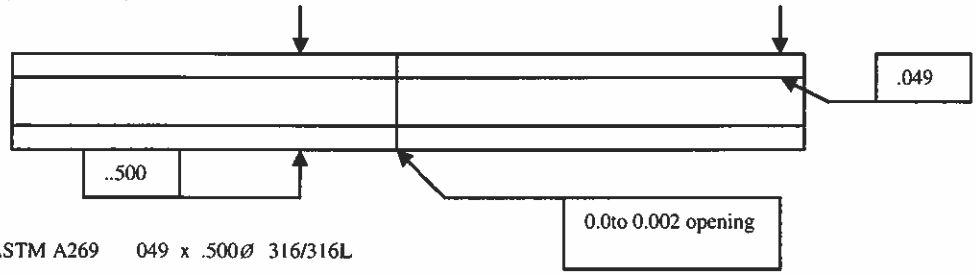
Welding Procedure Specification

Welding Procedure Specification No.: *Fermi WPS Cajon/Orbital 003*			**Date: 2/01/2010****
Revision No.:	**Revision Date:**	**Remarks:**	**Supporting PQR No.(s):** *Cajon/Orbital 003*
Welding Processes:	*GTAW/Automatic*	(2)	
(Manual, Automatic, Machine, Semi-automatic)			

Joints (QW-402):

Joint Design: Groove	**Backing:** Gas	**Backing Material (Type):** Argon Gas	**Remainder:**
• **Retainer:** *** No	**Type:** Non-Metallic *** Metallic (Non-fusing)		

Joint Details:



ASTM A269 049 x .500Ø 316/316L

Cajon Orbital Welding Machine (Autogenous only)

Base Metals (QW403):	S-No.: *8 Group 1*	TO	S-No.: *8 Group 1*
Specification Type and Grade: *ASTM A269 Type 316/316L*			
TO Specification Type and Grade: *ASTM A269 Type 316/316L*			
OR Chemical Analysis and Mechanical Properties:			
TO Chemical Analysis and Mechanical properties:			

Thickness Range:	**Process 1**		**Process 2**	
Base Metal:	Groove: .049	Fillet: Unlimited	Groove:	Fillet:
Deposited Weld Metal:	Groove: .049	Fillet: Unlimited	Groove:	Fillet:
Pipe Diameter Range:	Groove: .500 Minimum	Fillet: Unlimited	Groove:	Fillet:
Other:				

Filler Metals (QW-404)	Process 1		Process 2	
Specification No. (SFA):	*Autogenous – No Filler*			
AWS No, (Class):				
F-No.:				
A No.:	*8*			
Size of Filler Metals:				
Deposited Weld Metal Thickness Range:	Groove:	Fillet: Unlimited	Groove:	Fillet:
Electrode-Flux (Class):				
Flux Trade Name:				
Consumable Insert:				
Other:				

Each Base Metal-Filler Metal Combination should be recorded individually

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Positions (QW-405		**Post Heat Treatment (QW-407)**	
Positions of Groove:	*All*	Temperature Range:	*None*
Welding Progression	*Upward & downward*	Time Range	*N/A*
Positions of Fillet	*All*		

Preheat (QW-408)		**Gas (QW-408)**			
Preheat Temperature:	*Minimum 50° F*			% Composition	
Interpass Temperature:	*Maximum-Not Recorded*		Gases	Mixture	Flow Rate
Preheat Maintenance:	*None*	Shielding	*Argon*	*99.9%*	*10-15 CFH*
Minimum Welding Temperature	*32° F*	Trailing	None	***	***
		Backing	*Argon*	*99.9%*	*8-12 CFH*

Electrical Characteristics (QW-409)				
Current – AC or DC:	*Direct Current*	Polarity: *Straight*	Characteristics	*Pulsing*
Tungsten Electrode:	Size: *.040Ø*	*EWCe-2*		
Mode of Metal Transfer for GMAW:	*N/A*			
Electrode Wire Feed Speed Range:	*N/A*			

Technique (QW-410)	
String or Weave Bead:	*String*
Orifice or Gas Cup Size:	*Model CWS 5H Welding Head*
Initial Interpass Cleaning (Brushing, Grinding, etc.):	*Initial Solvent Clean***Wire brush between passes*
Method of Back Gouging:	*None*
Oscillation: *None*	
Contact Tube to Work Distance:	*N/A*
Multiple or Single Pass (per side):	*Single*
Multiple or Single Electrode(s):	*Single*
Travel Speed (Range):	*As Required*
Peening:	*None*
Other:	

Sequence Chart: Cajon Welding Systems for .049 x ½"Ø ASTM A 269 316/316L

Impulse	Maintenance	Frequency	Duty Cycle		Start	Duration	
56.0	**25.0**	**15**	**25**		**40**	**15**	

Pre-purge	Dwell	Down-slope	Post Purge		Speed		
10	**22**	**15**	**30**		**35**		

Special Notes		Gas Settings		
ARC Length	**.035**	Type	**Argon**	
Gage Setting	**.846**	Head	**12CFH**	
Material	**304/304L**	Tube	**10CFH**	
Wall Thickness	**.049**	Head Model	**5H**	Date: *2/01/2010*
Outside Diameter	**1/2Ø**	Power Supply	**100D**	Welder: *Harbacek #8*

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